DOCUMENT RESUME

ED 287 487 IR 052 164

AUTHOR Almquist, Sharon G.
TITLE Sound Recordings and the Library. Occasional Papers Number 179.
INSTITUTION Illinois Univ., Urbana. Graduate School of Library and Information Science.
PUB DATE Aug 87
NOTE 41p.
AVAILABLE FROM Graduate School of Library and Information Science, Publications Office, University of Illinois at Urbana-Champaign, 249 Armory Building, 505 E. Armory Street, Champaign, IL 61820 ($3.50 per copy; subscriptions are available).
PUB TYPE Historical Materials (060) -- Information Analyses (070)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Audiodisks; Audio Equipment; *Audiotape Recordings; Library Circulation; *Library Collection Development; *Library Collections; Library Facilities; Optical Disks; *Technological Advancement; Users (Information)

ABSTRACT

The basic concept that sound waves could be traced or recorded on a solid object was developed separately by Leon Scott, Charles Cros, and Thomas Alva Edison between 1857 and 1877 and, by 1890, the foundation of the present-day commercial record industry was established. Although cylinders were the first sound recordings to be sold commercially, discs were introduced in 1894 and ultimately became more popular. The library collection of sound recordings began with the founding of the Sadie Knowland Coe Music Collection at the Evanston Public Library in 1907 during the acoustic, or pre-electric era (1877-1925) when recordings were still made and reproduced by mechanical means. Following the introduction of electrical recordings, more libraries inaugurated record collections, albeit with some caution, and by the 1940s, the idea that collections of records belonged in libraries had won acceptance. The convenience of the long-playing (LP) record, introduced in 1948, appealed to the public and librarians alike; and stereo, introduced publicly 10 years later, provided the final great improvement for pre-1980s audio recordings. Most recently, direct-to-disc, digital, and compact disc (CD) recordings have resulted in clearer sound reproduction, as well as increased problems of selection, storage, and access for librarians. Ninety-six references are provided. (KM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED287487

University of Illinois
Graduate School of Library and Information Science

OCCASIONAL PAPERS

ISSN 0276 1769

Number 179
August 1987

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Sound Recordings and the Library

by

Sharon G. Almquist

IR052164

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

L. Hoffman

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Sound Recordings and the Library

by

Sharon G. Almquist

© 1987 The Board of Trustees of The University of Illinois

Contents

The Talking Machine 3
Cylinders or Discs? 5
The Acoustic or Preelectric Era: 1877-1925 9
  Libraries in the Acoustic Era 10
The Electric Era: 1925-48 11
  The Library in the Electric Era 13
Record Collections in Libraries: 1930s 16
Record Collections in Libraries: 1940s 17
The Long-Playing (LP) ERA, 1948- 19
Record Collections in Libraries: 1950s, After the LP 22
Stereo: A New Era 25
Direct to Disc, Digital, and the Compact Disc (CD): 1980s 28
Selection: What and Why 29
References 32
Vita 37

THE TALKING MACHINE

The basic concept that sound waves could be traced or recorded on a solid object was developed by three men in three separate places. In 1857, a Frenchman named Leon Scott built a "phonautograph." His invention resembled an inverted horn with a thin membrane acting as a sound resonator stretched across the narrow end. The membrane, with a brush attached, responded to the vibrations of sound waves. The membrane's movements caused the brush to etch a wavy line on the lampblack-coated paper wrapped around a revolving cylinder.[1]

Scott found that as the speed of the moving paper was doubled, the recorded wavelength doubled. This strict relationship between frequency wavelength and the speed of the recording medium remains basic to all types of recording today with the exception of digital techniques. Scott also discovered that louder sounds caused the line etched by the brush to move further from side to side—meaning greater amplitude. High sounds, on the other hand, caused a faster rate of vibration—higher frequency. Scott's purpose was to study and analyze different speech sounds. Therefore, sounds recorded with the "phonautograph" or sound writer could not be reproduced.[2]

Twenty years later, in 1877, another Frenchman, Charles Cros (1842-1888), realized that the process of recording could be reversed to produce a copy of the original sound. He called his theoretical machine a "paléophone." Theoretically, it recorded on a disc of lampblacked glass with the tracings later photoengraved into reliefs. Having neither the funds nor the technical knowledge to properly develop his concept, he wrote a paper about his theories on the reproduction of sound which he sealed and deposited at the Académie des Sciences in Paris in April. A popular account of Cros's theory was later published by Abbé Lenoir in the 10 October issue of *La Semaine du Clerge*. Lenoir called the device a "phonograph." Although it hardly seemed necessary, Cros had his paper opened and read publicly in December; his phonograph still had had no practical test.[3]

The American inventor Thomas Alva Edison (1847-1931), built the first practical machine in the late autumn of 1877 and received a patent for it on 19 February 1878. The device, also called a phonograph, used a grooved cylinder, not a disc, covered with tin foil and rotated by a hand crank. A sharp metal point connected a speaking-tube to the cylinder and indented the tin foil in response to the sound vibrations in the air of the tube. When the needle moved up and down to follow vibrations the method was called hill-and-dale or vertical etching as opposed to Scott's "phonautograph"

which used a side-to-side or lateral motion. To reproduce the original sound, Edison placed the needle at the starting point and turned the handle. The needle followed the moving indentations on the cylinder and produced sound. Tin foil was hardly a suitable material for either recording or playback, however. Because of its delicate nature, the life of the recorded sound on the cylinder was very short indeed.

What did Cros think of Edison's practical success? "Mr. Edison has been able to construct his machine. He is the first who has ever reproduced the human voice. He has accomplished something admirable."[4] Edison's first recorded words were: "Mary had a little lamb."

Which leads us to ask: How effective were these early reproductions of sound? Presented with a novelty, writers showered praise on the phonograph. Reputedly, the earliest machines barely reproduced an understandable version of the human voice; one had to hear what was spoken into the machine to understand what came out.

Despite initial interest and public acclaim, the phonograph and tin foil cylinder, limited by poor sound reproduction, could not maintain interest. Depressed at the lack of sales, Edison became distracted by the electric light.

While Edison neglected his invention, Chichester A. Bell and Charles Sumner Tainter applied on 17 June 1885 for a patent on a machine they called a "graphophone." The patent was granted the following year on 4 May 1886. Similar in design to Edison's phonograph, the graphophone's cylinder consisted of wax-coated cardboard instead of the original tin foil. Advantages to this were many: wax allowed a closer grooving on its surface increasing playing time, it was more durable and could withstand more replayings, and it simply sounded better. In addition, Bell and Tainter introduced a loosely mounted stylus that could be easily guided by a record which contrasted with Edison's rigidly mounted stylus. Bell and Tainter's patent also specified a disc, although they decided upon a cylinder before presenting the graphophone to the public in early 1887.[5]

After neglecting his invention since 1878, Edison rose to this challenge and introduced a cylinder made of solid wax. He called it the "phonogram." An article in *The Musical Times*, 1 November 1887, reported:

> That modern miracle worker Mr. Edison is "at it again." Having got the electric light out of hand, his restless inventiveness has taken up once more with what most of us had come to regard as a discarded toy—the phonograph....The instrument became a nine-day's wonder and then was practically forgotten.

Edison intended the phonograph and the phonogram for business purposes rather than amusement or entertainment. Recordings could be erased by shaving off some of the wax allowing the cylinder to be reused several times. For dictation devices, this became the dominant system and its offspring was the "Dictabelt."[6]

But the public wanted entertainment not a dictation device[7] and they got it. In 1888, eleven years after Edison's tin foil machine, the *Illustrated London News* described a recording of Handel's oratorio *Israel in Egypt*: "It reported with perfect accuracy the sublime strains, vocal and instrumental." Sir Arthur Sullivan noted: "I am astonished...and terrified at the thought that so much hideous and bad music may be put on record forever."[8] Ironically, Sir Arthur's statement in 1895 was itself recorded on a cylinder in London.

Before commercial recordings were available in 1890 or home or library phonographs made sound recordings more readily accessible, a subsidiary of Edison's North American Phonograph Company marketed a model of what later was to be called the jukebox. These were placed in public places and allowed anyone willing to invest a nickle to put on earphones—tubes which worked on the same principle as a stethoscope—and be entertained. Strangely enough, Edison's business phonograph powered by a storage battery fit entertainment needs better than the foot treadle operated graphophone. Edison may not have felt much enthusiasm about his business machine gracing such places as the Palais Royal Saloon in San Francisco—not to mention less respectable establishments—but an average "nickle-in-the-slot" machine earned about $50 a week.[9]

By June 1891 the Columbia Phonograph Company, an offshoot of Bell and Tainter's American Graphophone Company, began to offer the public the option of renting or buying its machines. Together with the introduction of the first commercial cylinders in 1890, the foundation of the present-day commercial record industry was laid.[10]

CYLINDERS OR DISCS?

By 1890 the first commercial cylinders were on sale and by 1894 the first commercial discs. Disadvantages of both included a poor quality of reproduction with only a fraction of the tonal spectrum caught and a playing time of only two minutes. Furthermore, production costs were high because neither cylinders nor discs could be efficiently duplicated or mass-produced.

Strings recorded badly while brass instruments did very well, and many pre-1900 recordings featured brass bands, cornet solos, the human voice—both singing and talking—and small groups that could easily gather around the recording horn. Many of these early records were "masters"—records made directly from the original performance each time and not reproduced from molds or stamped. The slow and inadequate duplication method used for cylinders consisted of playing a "master" cylinder and transferring the sound vibrations to a revolving wax blank next to it. In the late 1890s, Edison engineers made five masters each time a piece was performed. These five masters yielded 25 duplicates each before wearing out for a total of 125 cylinders. To keep up with demand, musicians still had to be persuaded to record the same piece many times. This contant repetition was tiring and variations in the quality of the performances inevitable. It is not surprising that under these circumstances the performances at the beginning of a recording session were often better than those done five or six hours later.[11]

In answer to the costs of production, difficulty in duplication, and quality control, a German emigrant to the United States, Emile Berliner (1851-1929), invented a mass-producible sound recording format. He returned to the principle of the disc; and a "gramophone," patented in 1887, was his machine to play it. At first, impressions were made in the lampblack surface of the disc by a stylus, set by an application of varnish, and then photoengraved on metal. Later, Berliner used a grease-covered zinc disc which, after recording, was dipped in acid with the resulting etchings then transferred to metal. Finally, he discovered a more economical way of duplication: a reverse or "negative" metal matrix was made from the original acid-etched master recording. This negative master made a positive "mother" disc which in turn led to negative stampers which were then used to stamp or press positive commercial discs. Toward the end of 1894 when the first mass-produced gramophone discs (or "plates") entered the commercial market, they were pressed in vulcanized rubber (vulcanite or ebonite) and advertised as being indestructible and possessing "the latest improvements regarding articulation and freedom from friction."[12] Perhaps they did, but problems arose because the rubber often flattened out, warped, and created considerable surface noise when played.

It was not until 1897 that the search for a suitable material ended with the introduction of shellac. It molded well enough to allow mass-production and was hard enough to allow multiple playings. On the negative side, shellac, a brittle material, cracked, splintered, or shattered if dropped. Furthermore, the compound contained abrasive fillers, such as emery,

limestone, or slate, which tended to wear a needle down after only a few playings and produced much surface noise.

The early needle used on shellac discs tracked at nine ounces (compare with today's one gram, 0.035 ounces, or less). Reportedly, one early record manufacturer even told customers that if a steel needle became dull, "the broken-off tips of darning needles...are excellent substitutes."[13] Fiber needles of cactus were also used a great deal and for a long time—as late as World War II. They could be resharpened when dull.[14]

Contrary to Edison, Berliner viewed the gramophone principally as a device for entertainment and issued songs by various performers on single-sided, seven-inch discs with a playing time of two minutes or longer. They sold for 50 cents apiece or $5 a dozen. The cheapest and most popular machine on which to play these records was the "Seven-Inch Hand Gramophone"; operated manually like a coffeegrinder, it sold for $12 in 1895. "The standard velocity for seven-inch plates is about 70 rpm," an accompanying manual explained, "a more rapid motion will raise the pitch and sharpen the sound; a slower motion will deepen the same."[15] But how was one to know when 70 rpm had been reached?

Technically, the early discs and the early gramophone could not compete in quality with Edison's fully developed phonograph and cylinders. In fact, the problem of an adequate and profitable mass-production method for cylinders was solved with the introduction of gold-molded cylinders in 1901. Although Edison had experimented with various molding processes since 1892, none were commercially feasible. Multiple piece molds left seams; single piece molds did not allow the cylinder to shrink enough to be removed and the groove depth remained too deep. In the gold-molded process, a master wax cylinder was electroplated with gold then plated with copper. When the wax was melted away, the remaining gold and copper became a negative mold with grooves on the inside. Melted wax was then poured into the mold and the cooled and hardened copy removed. Because they were molded under pressure, a harder wax mixture could be used allowing an increase in volume and greater clarity.[16]

In 1908 Edison introduced the Amberol series of cylinders whose surfaces were improved with a grooving of 200 lines per inch increasing the playing time from two minutes to about four. (Discs already had a playing time of four minutes and when the German Odeon Company introduced double-sided discs in 1904, two four-minute selections could be placed on a disc.) Problems arose, however, because the fine grooves could not withstand the

pressure of the stylus and were quickly damaged. These problems were solved when, in 1912, Edison marketed the Blue Amberols and claimed they could be played 3000 times without wear. Unlike shellac discs, the Blue Amberols had smooth, hard plastic-like surfaces, almost noiseless, and could be played with a polished diamond playback stylus also introduced by Edison in 1912.[17]

Cylinders had another advantage over discs in that the groove velocity remained constant to the stylus. In a constant rpm, lateral-cut disc format, the velocity decreased continuously as the stylus moved closer to the center of the disc causing distortion. Various methods to combat this problem led to motors that speeded up as the stylus tracked across the disc,[18] and the recording of alternate sides of a set of discs comprising a single piece from the inner groove outward, or the outer groove inward, to make differences in the quality of sound less apparent when discs were changed in the middle of a piece.

Edison's cylinders held the advantage for acoustic recording with the hill-and-dale cut, the stylus moving up and down in the groove, not as with discs, laterally or side-to-side. When a sudden loud tone occurred on a disc recording, it threatened to blast its way through the record groove wall, but on a cylinder, loud tones merely plunged deeper and did not endanger the delicate grooves. Singers recording on discs were warned to step back from the recording horn before singing a fortissimo.[19]

Still another problem plaguing discs was the lack of a standard rotational speed. Cylinders, on the other hand, had a standard speed of 160 rpm for molded cylinders and 120 rpm for nonmolded cylinders. Berliner's original discs were recorded at 70 rpm. Other common speeds were 74 rpm, 82 rpm, and some French Pathé recordings (as well as English and German) ran at 90 rpm. Others slowed to 60 rpm. Because performances were recorded at these speeds, playback speeds should have been compatible to retrieve the original sound. Not so. Pitch and tempo varied greatly as discs were played on different machines at first powered by a hand crank turntable, later by a spring-powered turntable drive. By 1905, the most common recording and playback speed was 78 rpm, a compromise between playing time and fidelity. It was not until after World War II, however, that 78 rpm became the standard. Various turntable motors powered by gravity, batteries, water, and finally electric current kept speeds more or less stable.[20]

Despite the earlier technical superiority of the cylinder, it vanished after World War I and discs became the standard of the record industry. "Gramophone" and "phonograph" came to mean the same kind of machine which played discs. The Columbia Phonograph Company, a cylinder

manufacturer, offered discs for sale as early as November 1901. It continued to produce cylinders and graphophones for a declining demand until abandoning them totally in 1912. Even Edison, while still favoring the cylinder, introduced a disc-playing machine in 1913 although it still used the vertical and not the lateral cut and was not compatible with other machines. Edison's laminated discs one quarter inch thick on a "condensite" base, revolved at 80 rpm. Ten weeks before leaving the phonograph business altogether in late 1929, Edison capitulated and introduced a lateral-cut disc record.

Essentially the disc won because: (1) it was more convenient to store and handle, (2) it was more easily mass-produced, and (3) those who marketed discs were shrewder and more aggressive than their opponents. Advertising sold the disc. Eldridge R. Johnson (1867-1945), founder of the Victor Talking Machine Company, recorded the "world's greatest solo artists," mainly singers, and advertised that they were available exclusively on his "Red Seal" shellac discs. Full page advertisements featuring the "Victor Dog," Nipper, listening to a Victor gramophone appeared profusely in newspapers and magazines. In 1906, Johnson introduced the first machine to have an internal horn and called it the "Victrola." With this, Victor advertising and influence established a style trend. The phonograph had become an item for the home, a piece of furniture, and the large external horns of the early talking machines were unsightly. Even though external horns were considered at the time to be technically superior, other companies striving for their share of the market followed Victor's lead, including Edison. By 1912, Johnson dispersed an annual advertising budget of $1.5 million. The disc became profitable and popular and, though inferior in many ways to the cylinder, it won the battle.[21]

THE ACOUSTIC OR PREELECTRIC ERA: 1877-1925

The phonograph and the cylinder, the gramophone and the disc, were part of the acoustic or preelectric era—recordings made and reproduced by mechanical means. Musicians performed into a large horn which transmitted and amplified sound vibrations to a diaphragm and a cutting stylus. Because of the consequent restrictions on dynamic and frequency range and the need to perform close to the mouth of the recording horn, the human voice was found to reproduce very well. When music performed by an orchestra was attempted, however, the size of the orchestra was often reduced. Instruments were frequently left out or replaced; a tuba, for example, substituting for a double bass. Furthermore, until the early 1920s, most recordings of longer works were greatly abridged in order to fit on the

four-minute sides. The first complete opera, Verdi's *Ernani*, was recorded in 1903. It took up 40 single-sided discs and was issued on the H.M.V. label.[22] The first complete orchestral recording, Beethoven's Fifth Symphony, was not made until 1913. The Berlin Philharmonic was conducted by Arthur Nikisch and filled eight single-sided 78 rpm shellac discs.

Libraries in the Acoustic Era

1914—"it would seem to be quite as legitimate for a library to possess good music rolls or disks, stereopticon pictures, and all material of a similar kind to be lent to societies, institutions, homes, and individuals with as great propriety as books and other material are now lent."[23]

In 1907, the Evanston Public Library began to circulate pianola rolls—or player-piano rolls—for home use. A different sort of recording was the roll, and a different sort of playback equipment was the piano. "The use of the pianola in the library [in 1908] was an experiment for which we had no precedent,..." Mary Lindsay, the librarian at Evanston, reported in 1915.[24]

The music collection at Evanston, known as the Sadie Knowland Coe Music Collection, was founded in April 1907. Along with books and scores, it began with 572 player-piano rolls and a Weber pianola-piano. Player-piano rolls were loaned just as books on a regular borrower's card. Obviously appreciated, the rolls were not seriously damaged, Lindsay reported, despite heavy use both within and outside of the library. The only problem was the wear, in the form of tears and creases, on the ends of rolls caused by careless rerolling. This collection remained popular even after the introduction of the phonograph. In 1932, the piano was reserved, often in advance, at noon and on Sunday evenings.[25] By 1934, the collection totaled over 1000 rolls. The rolls eventually disappeared, however, and in 1940 the library offered 78 rpm discs for circulation.[26]

In 1911, a few years after Evanston's experiment, the Morrison-Reeves Library in Richmond, Indiana, began to circulate player-piano rolls. By 1915 the collection exceeded 2000 rolls.[27] In that same year, the Kansas City Library Art and Music Department started circulating player-piano rolls.[28]

The Gary Public Library in Indiana bought a Steinway piano in 1913 and fitted it with a Gulbransen player mechanism. Player-piano rolls were used both in the library and circulated. By 1915, the library owned over 500 rolls of popular music, light opera, and classical music. A discount, which the library received on player-piano rolls, helped make this possible. Local dealers approved the circulation of rolls saying it was good for business; as they would do later with records, patrons tried out a roll and decided

whether or not to purchase it. The auditorium at the Gary Public Library hosted recitals featuring both "live groups and player-piano rolls."[29]

The Birmingham Public and Jefferson County Free Library, Birmingham, Alabama, opened a music section in 1917. By 1926 the collection contained 525 player piano rolls.[30]

The trail from roll to record commenced in 1914. The first documented record collection in a public library was that in the St. Paul Public Library in Minnesota. Thirty-seven years after the invention of the phonograph, it owned 93 records (discs not cylinders). Player-piano rolls were lent to any patron of the library, but the discs circulated only to schools or societies. As with player-piano rolls, librarians were concerned about the wear of records and their proper care. To each borrower, therefore, the library gave a list of directions. "Great care is necessary in order to keep records from being scratched. Dust should not be allowed in the case where records are kept. A new needle is required each time a record is used. Breakage will be charged to the borrower."[31]

Two years earlier, in 1912, the Forbes Library, Northampton, Massachusetts, had bought a "graphophone and discs" for the supervisor of music in the public schools. It was destroyed in 1913 by a fire at Northampton High School where it was stored, but, in 1914, the library purchased four Victor machines and 13 records. They remained for the sole use of the public schools.[32]

In 1914, the Virginia Public Library in Minnesota inaugurated a series of record concerts in the library. Stella Stebbins and Ethel Wright gave "Victrola" concerts on Sunday afternoons. The programs were printed in the local newspaper and copies posted in the library. Records were borrowed or rented from the Victrola dealers and were purchased after audience approval. "By means of these Sunday concerts," the librarians noted, "foreigners have been brought to the library who otherwise would be very difficult to reach."[33] It would seem that records were a form of outreach program even at this early date.

THE ELECTRIC ERA: 1925-48

When the first commercially operated radio station, KDKA, Pittsburgh, went on the air in 1920, it foreshadowed the end of the acoustic era. The radio receiver and amplifier allowed improvements formerly unattainable and the microphone, which could pick up sound waves and convert them to electrical signals, replaced the acoustic recording horn. These advances

allowed the amplification of sound both in the original recording and in playback and improved sensitivity and frequency response, especially in the acoustically-suppressed lower registers. Microphones allowed groups of any size to be recorded in the original scoring, and large or small, they no longer needed to gather around a horn. Microphones also permitted pieces to be recorded straight through by switching between two different recording machines. Though still limited by four-minute sides, the emphasis shifted to the recording of complete works in their original scoring. Increased frequency range and volume caused new problems, however. Distortion became more noticeable and at recording sessions more care had to be taken not to pick up background noises.[34]

Phonograph companies kept the electrical recording process a secret just long enough to clear the shelves of acoustically recorded records without great loss and to construct machines capable of doing justice to the new recording process. The companies were also trying to electrically rerecord the classical repertoire as well as popular artists. When the new discs were finally introduced, sales soared.

The first commercial electrical recordings were issued by Victor and Columbia in 1925. One of these (Columbia 50013-D) was recorded on 31 March 1925 at the Metropolitan Opera House in New York City. On one side were 850 members of the Associated Glee Clubs of America singing *John Peel*. On the other side they were joined by the audience of 4000 for *Adeste Fideles*.[35]

At first these new electrical recordings were played on existing acoustical machines. As a compromise, the Victor Talking Machine Company offered the Orthophonic Victrola, an acoustic (mechanical) machine adapted by the Bell Telephone Laboratories to play electrically-recorded records. There was also the Panatrope, an all-electric phonograph manufactured by the Brunswick Company in collaboration with General Electric. Considered practical for home use, it sold for over $350. The Victor Company introduced an all-electric phonograph in 1926.[36]

In October 1929 the stock market crashed and so did the good fortunes of the phonograph industry. By 1932, phonograph industry sales dropped to their lowest level, 6 million from over 100 million in 1927. The depression and radio overwhelmed it. Radio offered good sound and free "live" entertainment at the flick of a switch. The phonograph, on the other hand, offered equipment at inflated prices and "canned" music. One consequence of the phonograph's near demise was the purchase by the Radio Corporation of America (RCA) of the Victor Talking Machine Company in 1929. From then on Victor was known as RCA Victor.

Business took an upward turn in 1934. Electrical phonographs improved and RCA Victor introduced the "Duo Jr." an inexpensive ($16.50) machine which could be attached to a larger radio set. Phonograph sales expanded and the phonograph was no longer in danger of extinction. The only major problem occurred a few years later in 1942 when nonmilitary use of shellac was cut back by 70%.[37]

The Library in the Electric Era

With the introduction of electrical recordings and playback equipment, more libraries inaugurated record collections, but the movement was not headlong. The profusion of technical improvements (both real and implied) prompted caution. There was, as well, in some cases, a snobbish bias against the "luxury" of records *v.* the "necessity" of print materials. Articles appeared throughout the decades and even up to the 1960s expounding reasons for or against the establishment of record collections, either complaining that not enough libraries had them or advocating their dismantling.

Selection of records to buy for the collection was also a problem. Some librarians clearly relied upon chance—such as gifts from patrons—while others used rental services which prepackaged a group of recordings of various styles according to what was available at the time. Still others gave as much thought to the acquisition of records as they did to the acquisition of books. Morton Lee (Studio 49, Metropolitan Opera House) stressed the extreme importance of selecting good performances since a single poor performance could cause a person to dislike a work for the rest of his life.[38]

Still another problem was the selection and maintenance of equipment. Throughout the years, many librarians seem to have been reactionary in their views toward equipment. With the profusion of speeds, groove sizes, and the quick technical improvements which have made the state of the art obsolete overnight, librarians have had every right to be reticent about committing their resources to new technology.

With the equipment itself, the choices were never easy. During the 1940s and 1950s when many libraries were starting their record collections, the state of the art was constantly changing. Fidelity improved, speeds changed, but unfortunately, commercial makers of phonographs did not produce machines of sufficient quality or sturdy enough for library use. The only course available to the conscientious librarian was to build his/her own equipment. Consequently, articles explaining construction techniques and giving plans for amplifiers and other equipment began to

appear in the library journals of the 1950s and 1960s. In addition, headphones were still not in wide use and as a result separate soundproofed listening booths had to be constructed for each machine—if the library could afford the expense and space. It was not until 1960 that a specially designed unit with headphones became available to libraries.[39]

The experiences of some specific libraries illustrate these and other problems and their solutions. The Detroit Public Library's record collection started during the acoustic era (1921) although most of its development took place during the electric era. Originally intended for group use—as was the Forbes Library collection—records were circulated only to schools and clubs. Selection was based on three criteria: the needs of the music appreciation classes in the public schools, the needs of local women's "study clubs," and the needs of the Detroit Symphony Orchestra's "music memory contests."[40]

Eventually, the circulation service was extended to all users of the library for a rental fee of five cents a day although records still circulated at no charge to teachers and clubs. Unfortunately this arrangement was bad for business since no patron would admit to not being associated with a club. Mythical organizations were concocted, and the library received very little income from rentals.[41]

The service changed again in 1937 with every user charged three cents a day. The results were immediate: circulation tripled in the first year and income from rentals allowed new recordings to be purchased from an annual income of $900.[42]

By 1944, the expanding circulation brought requests for records other than music—e.g., children's records, sound effects, shorthand dictation practice records, bird calls, poetry readings, and drama. These requests were filled. Patrons also wanted recorded language study courses. The librarian at Detroit, H. Dorothy Tilly, recalled

> the case of a man from the Internal Revenue Office who dashed in one day demanding the Polish grammar records, complaining loudly and bitterly that he couldn't even explain the Income Tax in English so that anyone could understand it, and how in....was he going to explain it to a lot of Poles who couldn't even speak English.[43]

The Detroit Public Library also supported a noncirculating reference record collection. Begun in 1942, its purpose was the preservation of rare recordings including unique local items. These reference discs were never to leave the library. To do so would, of course, subject them to the enormous amount of wear and tear the circulating discs faced. Many of the

circulating discs were duplicated in the reference collection so that after the circulating copy had been discarded the reference copy remained.

In 1928, two more record collections were established: one at the Yale University School of Music and another at Antioch College in Yellow Springs, Ohio. At the latter a music student bought a Victrola phonograph for $245, borrowed records from Dayton 20 miles away, and initiated the custom of Sunday afternoon musical concerts. At the end of the concert a collection was made and the money used to pay for the Victrola. By 1929, funds from a grant allowed the library to purchase records intended to circulate exactly as books. Any student, not just those enrolled in music appreciation courses, could borrow them.[44]

The collection consisted wholly of recorded music and had two goals: (1) to encourage music appreciation, and (2) to help students build their own personal collections. To this end, less expensive single records, which individuals could acquire themselves, were not purchased; albums were preferred. The library specialized in records containing compositions unaffordable to most people such as the three volume set of the *St. Matthew Passion* by J.S. Bach. Duplicates were also acquired in order to give patrons a choice between various interpretations of the same composition. In effect, the library stimulated personal acquisition. "In good weather," the librarians reported, "the campus is filled with melodies from portable outfits."[45]

By 1934 the collection contained over 125 albums and works by more than 45 composers. "Early composers such as Bach, Haydn and Mozart are to be found with the modern Sibelius and Stravinsky." Music from all countries was collected with a special emphasis on symphonies. The library owned, for example, all the nine symphonies of Beethoven. A "score sticker" pasted inside the front cover of albums called patrons' attention to corresponding scores in the Antioch Library's collection.[46]

Approximately 400 albums circulated each month. They could be checked out for three days at a time, were nonrenewable, and overdue fines were five cents per day per record. When returned, each record was examined for damage with 50 cents charged for scratches. As usual, broken records had to be replaced at the borrower's expense. After 100 circulations, the record was withdrawn from the collection, marked down to below original cost, and sold to students.[47]

The collection increased to 1900 records averaging 3 records to the album by 1940. By 1941, the Music Library was open 33 hours a week and had its own librarian who noted that: "Sunday 'vic' concerts are given quite

regularly out of doors during the spring and fall." Obviously the tradition begun by a student in 1928 was still going strong supported by the library in 1941.[48]

RECORD COLLECTIONS IN LIBRARIES: 1930s

1933—"Certainly the records are as important as books...and they deserve as careful attention from the librarian."
Ralph E. Ellsworth, librarian
Adams State Teachers College
Alamosa, Colorado[49]

The Minneapolis Public Library started its record collection in 1932. A discarded phonograph was acquired, a soundproof room built, a piano borrowed, and signs hung in the library saying: "The Library Wants Phonograph Records." By 1938 they had 1000 records, five machines, and a budget for new acquisitions. The majority of the collection continued, however, to be made up of gifts.[50]

Louise Chapman, the librarian at Minneapolis, was concerned about wear and the type of equipment used by patrons at home. Still she stressed the "happy medium" between use and preservation. All records obtained as gifts were circulated; those purchased by the library were kept for library use only in the soundproof room. Chapman's comment about a well used recording of Beethoven's Fifth Symphony which came to the library second hand in 1935 was: "With a fiber needle the reproduction is still very good, and with a steel needle it appears to be almost like new."[51]

Circulation rules allowed patrons to borrow only six records at one time. Users of the soundproof room were required to register their name and address and leave their library card at the desk. Time allotted in the room was 30 minutes but could be extended if no one was waiting. A fiber needle was used in the library. If a steel needle was to be used at home, the library requested that it be changed with every record. Damages were, as one would expect, charged to the borrower. "One chap had a rather expensive fifteen minutes," Chapman reported, "when he laid a record on the chair [in the soundproof room] and then sat on it."[52]

Other record collections begun in this decade included: the record library founded about 1930 as part of the Princeton University Music Collection, the record collection of "a Mr. Ditmars" given in 1934 to Mills College Library in Oakland, California by a Miss Persis Coleman, and the University of Kentucky Music Library which received a gift of "victrola records, scores, librettos, books, etc." from the Carnegie Corporation of New

York.[53] The aim of the Carnegie Music Sets was the broadest coverage of music history; the discs were not meant to circulate.

In 1934, Herbert W. Wilson of San Francisco established a commercial record lending library and ran it as a business enterprise. Created originally as an "adjunct to the establishment of a retail sales store," rentals outweighed sales. Wilson encountered the same problems as libraries. First, a good electric phonograph was expensive, and even a good tone arm (circa 1944) was heavy and put a great deal of weight on a record. Second, even though Wilson strived to keep up with technology and worried about wear, most customers played rented records on obsolete, crank-wound, and often portable acoustic machines. Third, a condition of lending was the use of nonmetallic needles, but gouges, extreme needle wear, and deep scratches were testimony to renters' noncompliance. Like the unfortunate gentleman at Minneapolis who sat on a record, Wilson also reported broken records "as for instance when they were involuntarily gripped too strongly in running for a street car."[54]

Records returned to Wilson's library were inspected with damages charged to the customer. For those who had no home machine, Wilson provided soundproof booths—for a fee, of course. If a customer made a purchase, however, there would be no charge for playing time. "Despite the lively interest and wide patronage of the public," Wilson commented, "a circulating library of records does not pay for itself." So why did he do it? "The non-monentary satisfactions derived from building up and conscientiously maintaining a complete classical record library will keep this one going."[55]

RECORD COLLECTIONS IN LIBRARIES: 1940s

In April 1940, the National Committee of Music Appreciation formally presented the Newark Public Library, New Jersey, with 50 albums. This promoted a free lending policy allowing patrons to take out as many records as they wanted. The circulation period was seven days. At first the library had to rely on gifts to increase the collection, but by 1944 the budget allocated for music recordings was $250.

For listening, the library had neither a soundproof room nor a good phonograph. On a portable Magnavox, the librarians would "play day in, day out, any records that people want to hear." Instead of organized programs at fixed hours, patrons could hear what they wanted, when they wanted, in an informal setting, and for all to hear.[56]

The record collection at the Carnegie Library of Pittsburgh was initiated in 1941 with a gift from Edward C. Bald, Jr. By 1963, the library had 2600 records with an annual circulation of 35,748. The collection grew slowly because frequently borrowed records became worn and had to be replaced. With an annual budget of $10,000, at 1963 prices, about 800 to 900 records could be purchased including replacements. The library and the two universities in town cooperated to limit duplication of performances. Service to all the public, however, required some deliberate duplication on the library's part. Like the Antioch College Library, discs that circulated 100 times were reduced in price and sold in Pittsburg in a store called "Andrew's Corner." The money from the sales was used to buy new recordings.[57]

Another record collection got its start at Riverside Public Library in California in 1948. Ten years later (after the introduction of the long-playing disc), the library still listed its 78 rpm records as circulating and circulating without a rental fee. On the other hand, the library's 500 LPs of music, poetry, language study, dictation practice, drama, and 100 children's records were only available for a rental fee of ten cents per record. By 1957, the library reported an annual circulation of 8128 records with an average monthly income of $65. One of Riverside's main goals, like Antioch's, was to provide performances and compositions not usually found in private collections. They also sought to build as complete a collection of opera as possible to allow patrons the opportunity to audition works they might not otherwise know.[58]

In 1945, the Music Department of the Boston Public Library extended its phonograph listening service to the general public as an "experiment." The service had been formerly only available to members of the armed forces, but because so many of them were abroad, the use of the facilities had slackened.[59]

Circulating record collections were started in 1946 at the Alameda Free Library, California, and the Worcester Free Public Library, Massachusetts. At the latter, 14 albums were purchased from a local music store and displayed at the return desk in the Humanities Division. Albums were loaned for seven days at a fee of ten cents per album. A year after its inception, the collection numbered 500 albums and was still growing. The Lake Geneva Public Library, Wisconsin, began its circulating record collection in 1949 and in that same year the Monterey Public Library, California, introduced a record collection consisting solely of classical music albums.[60]

The Grosvenor Library, Buffalo, New York, received a gift of 7000 records in 1940. Besides the standard classical fare, ragtime, jazz, and swing were represented. Also included were recordings of the voices of U.S. presidents. The terms of the gift specified that the valuable records and expensive sets not circulate, but the more common recordings could be borrowed. As did most lending institutions, the library requested that patrons use fiber needles at home. By 1947, the collection contained over 12,000 discs.[61]

Besides the lending collection at the Grosvenor Library, Buffalo residents could, for an annual fee, become members of the Disc and Score Club. The club supported a collection of records and small scores comprising most of the standard classics. Members could borrow records and scores for two weeks or make use of the club's listening room and phonographs. New acquisitions were constantly added to the collection and worn materials replaced.[62]

By the late 1940s, the idea that collections of records belonged in libraries—especially as circulating collections in public libraries—had won acceptance by both the public and librarians. Whether circulated for a rental fee or free, records brought people into the library who had never come before. When the local newspaper featured an article on the Worcester Public Library's record collection, the librarian noted that: "People actually put on their hats and coats, and hurried to the library to rent an album!"[63]

Increased use by the public demanded greater service from the librarians. The public's curiosity was stimulated and as a result one librarian observed that: "In addition to strange reference questions, librarians never know if they will hear a few notes whistled into their ear for identification, when picking up the telephone receiver."[64]

THE LONG-PLAYING (LP) ERA, 1948-

One of the great drawbacks of the 78 rpm recording was the discontinuity caused by the four-minute sides. Automatic record changers helped, but the annoyance of interrupting a concerto in the middle of its exposition remained. The solution? In July 1948, the Columbia Company of America introduced the first practical long-playing records called LPs. Columbia increased playing time in two ways: by reducing the speed from 78 rpm to 33 1/3 rpm and by using a narrower groove-cut called "microgroove." Smaller needles and lighter tone arms were also developed. On a standard 12-inch disc, 20 minutes of sound could be recorded per side; 15 minutes on

each side of a 10-inch disc. To ensure a quiet surface at the slower speed, the LPs were pressed on vinylite instead of shellac. Vinylite also made the LPs virtually unbreakable and allowed for a lighter, easier to store, more flexible, durable disc.

Former attempts at lengthening playing time by Edison and the Victor Company had failed. In 1926, Edison introduced 12-inch acoustic discs revolving at 80 rpm. To increase playing time, he shrank the size of the grooves from the standard 150 grooves per inch to 450 (current LPs have 250). While this increased playing time to 20 minutes per side, it also made the thinner grooves more prone to damage from the heavy tone arms of the day. Within a short time after their appearance, the discs were discontinued.

The Victor Company manufactured a "Program Transcription Disc" in 1931 which retained the large groove size but whose speed of rotation was slowed to 33 1/3 rpm. This increased playing time to about 14 minutes per side, but the system failed for two reasons. First, the material records were made of at the time was shellac—called Vitrolac by Victor—and shellac produced considerable surface noise. When the record was moving at the faster speed of 78 rpm, the noise created was, in part, inaudible. But when the record's revolving speed was slowed to 33 1/3 rpm, the frequency of the sound was lowered, bringing normally inaudible noise into the range of human hearing. Such noise was further intensified by the improvements in frequency response being built into the machines themselves. Second, Victor issued recordings which could be purchased more cheaply on 78s. By 1936, Victor abandoned the idea for commercial use and the Program Transcription Disc was used principally in radio stations for air checks, and recording and playback of radio programs.

In February 1949, RCA Victor, long Columbia's rival—and not wishing to be outdone—rejected the 33 1/3 rpm format in favor of the 45 rpm, seven-inch microgroove disc. Supporting hardware consisted of a small machine with the quickest and quietest record changer available at that time. RCA Victor Vice President James W. Murray predicted that the setup "will be the criterion of standardization for the future." An improvement on the heavy 78 rpm machine and disc, the 45 still failed to improve continuity because the 45s playing time was the same as the 78s. Even the extended play (EP) 45 only held about eight minutes per side. Indeed, after the first classical releases were issued, *Recordings* called the system "an obsolete principal complicated by defective mechanical application." The smaller disc did offer a few advantages. Because of its size, it was practically distortion free, less susceptible to warping, and easier to store. RCA Victor even claimed that there was music on airplanes thanks to compact 45s.[65]

The battle continued. The public and librarians were faced with records of three different speeds, two types of spindles, and two groove widths. Different equipment was needed to play each type. After several years of confusion, the companies realized that sales were being lost because consumers were unsure which of the three speeds would eventually prevail.

The end came in January 1950 when RCA Victor acknowledged the superiority of the LP for classical music and the 45 rpm for short popular recordings. By 1965 the classical repertoire was entirely on LP. Manufacturers were licensed to make records in any of the three formats and equipment became compatible. In essence, however, the introduction of the LP system brought about the demise of the 78 rpm shellac disc.

Another major step in sound recording technique was the development of magnetic tape. Theoretically described in 1888 by Oberlin Smith, "tape" was first practically used in 1899 by a Danish inventor named Vladimir Poulsen (1869-1942) who called his tape recording device a "Telegraphone." Poulsen used a signal taken from an electromagnetic head to a steel wire moving at seven feet per second. Problems were cost, long rewinding time, and an inability to make duplicates.

Later, two Germans continued this research. Kurt Stille recorded sound on steel bands, and Pfleumer developed the concept of magnetic coating of plastic or paper tape. In 1931 the Allgemeine Elektrizitäts-Gesellschaft expanded Pfleumer's idea and, for the first time, recorded a symphony orchestra on tape on 19 November 1936. Further development was interrupted by World War II, and it was not until 1946 that John Mullen and Alexander Poniatoff introduced the German machines into the United States and formed the Ampex Corporation, U.S. This led quickly to the adoption of tape recording by the broadcasting and recording industries. In the recording studio, tape allowed selections to be erased and rerecorded and simplified the editing process. By 1950, tape had supplanted the "direct-to-disc" recording process—to which we have briefly returned in order to eliminate tape recording and its resultant hiss.

In the 1960s, the tape recording industry offered further advances—multitrack recording of two or more channels of sound simultaneously and cassettes. The Dutch Philips Company developed the cassette which gave consumers a choice over unwieldy, irksome reel-to-reel tapes and equipment. It used one-eighth of an inch tape at a speed of 1 7/8 inches per second, but the early sound quality, with its limited frequency response and inordinate amount of tape hiss, could not then compete with discs. The cassette was, however, portable and appealed to people desiring a fairly foolproof means of entertainment other than radio. In 1965, the

problems of poor frequency response and tape hiss were overcome when the Dolby Noise Reduction System was introduced.

The combination of tape recording and the mass-produced LP accelerated recording activity and expanded the recorded repertoire. Complete opera recordings, not really feasible on 78 rpm and infrequently attempted, fit well on LPs. English Decca (London in the United States) was the first company to record much Italian opera on LP and featured such artists as Tebaldi, del Monaco, Bastianini, and Siepi in the 1950s. European EMI (Angel in the United States) followed with a series recorded at La Scala, Milan, highlighting Callas, di Stefano, and Gobbi. In New York City, RCA Victor used premier singers from the Metropolitan Opera.

Instrumental music also benefited. Standard orchestral works and music from periods neglected on 78 rpm discs became available. The Baroque Era was ably represented in the 1950s by the Vox Company and L'Oiseau-Lyre. Medieval and Renaissance music also came to the LP. Although record companies can be and were at times adventurous, there remained in the LP era a rift between works frequently recorded and those recorded not at all.

RECORD COLLECTIONS IN LIBRARIES: 1950s, AFTER THE LP

By the 1950s the phonograph had become a standard household fixture. More records were available, they sounded better, the hi-fi craze was in vigorous infancy, and the repertoire of recorded compositions had increased. The convenience of the LP appealed to the public and librarians alike.

While most users of recorded sound heralded the LP as a major breakthrough in sound technology, some critics derided the move to a plastic disc. They felt that it was not necessary for a library record to be unbreakable or bendable. Besides many librarians discovered that while LPs did not break, they were more prone to scratching and warpage; and with most home machines still using pickups tracking at two ounces or more, the soft plastic deteriorated. George Sherman Dickinson, Vassar College, Poughkeepsie, New York, felt that the new LPs were fads. Even though promising an expanded repertoire, he believed that LPs were too fragile to be feasible in an academic [not to mention public] setting.[66] They were not only fragile but twice as expensive as the usual discs. A high price to pay even for RCA Victor's transparent red pressings. Kurtz Myers commented that in many cases shellac was superior to vinyl in sound—which, in the first years of the LP, was frequently true. Flawed surfaces, uneven sound quality, and other faults were reported. Myers also railed against the

cardboard album covers just being introduced saying that they were wholly unnecessary and merely a ploy of the record companies to sell their product (78 rpm discs were originally sold in plain brown wrappers).[67] That may have been an accurate observation. Record companies have been known to reissue the same performance in another wrapper. There was, for example, the case of an opera which began life as an RCA full-priced disc, became a discount priced "Victrola" RCA release in a different package a few years later, and finally was rereleased by London at full price in yet another package. On the positive side, colorful record jackets enhanced exhibits in libraries, besides protecting the disc itself from dust and warpage—not that it need be colorful for the latter. Well-written liner notes often provided information not available elsewhere about an obscure composer.

Advances in recording technology after World War II, probably more than any other factor, spurred the widespread establishment of record collections in libraries during the 1950s and 1960s. The Madison Free Library, Wisconsin, assembled a collection of classical and semiclassical records in 1948. By 1954, most patrons requested LPs although there was still a demand for 78s. To keep up with this demand, the library bought 78s from individuals changing their personal collections from 78 rpm to LP; LPs were purchased from record dealers. Gifts were also accepted but only after audition. Those too worn were not considered worth processing. As a "luxury" the library acquired several complete operas. The idea, advanced by many libraries before and since, was to provide recordings unaffordable to most private collectors. While the LP was generally praised, the librarian at Madison, Ruth Anderson, commented that LPs were harder to catalog than 78s because there were more selections per disc than formerly.[68]

In July 1951 the Wilmette Public Library's collection was inaugurated with the opening of a new building. The collection, purchased with library funds and circulated free of charge, soon developed a problem. Damage was common and, with no income from rentals, replacement proved difficult. The solution came just three months after the collection began; records were rented out for 10 cents per week per LP, 25 cents for any album of more than three records, and 50 cents for Gilbert and Sullivan albums. "The discrimination against these worthy gentlemen was necessary," Helen Siniff, the librarian explained, "because of the excessive abuse given to their records which made frequent replacement necessary." As a result of the fee, circulation dropped but records were treated better and the library's "public relations problem in regard to scratches" was practically solved. Surprisingly, Siniff reported that most patrons were willing to pay the rental fee in order to have records in better condition and to enjoy a

greater variety of recordings. Especially pleased were "the large proportion of hi-fi addicts who demand perfection in records."[69]

The Iowa City Public Library, Iowa, did not charge a rental fee but required a five dollar deposit against possible loss or damage. When a patron discontinued borrowing records the deposit was returned. Joyce Nienstedt, the head librarian, commented that, "you'd be amazed at the number of people who say, 'Keep my five dollars, my enjoyment has been worth it.'"[70]

Although starting its Films and Recordings Center in 1947, by 1956 the Public Library of Cincinnati boasted of having 10,000 discs in a varied collection of serious and folk music, operettas, musical comedies, poetry, drama, language courses, dictation practice, and "bird and frog calls." Recordings were loaned to all patrons free of charge. Six discs or one album could be borrowed at a time and could be used for one week at the discretion of the librarian. Regarding the preservation of the discs, instructions to the public allowed the use of metallic needles with the provision that they be changed as frequently as the manufacturer directed. Filed by accession number and in open stacks, the LPs occupied one section and the 78s another. Though no longer manufactured, 78 rpm discs were still circulated even though they could not, by 1956, be replaced.[71]

The library provided listening rooms for their patrons as well as phonographs each with eight earphone jacks. The speed controls on the phonographs were removed and in turn designated for 78 rpm or LP use only. "Because we find that patrons do not read signs, to make these multiple speed machines foolproof we have removed the speed control knobs." Karline Brown, the librarian at Cincinnati reported.[72]

The listening rooms contained three-speed Columbia 360ks. The "k" referred to the machine's diamond needle about which Brown noted, "a diamond is a public library's best friend since it requires infrequent changing." More importantly she added that, "a public library's purpose in lending recordings is to have them borrowed as widely as possible in the community...." She went on to observe that wear occurred in different ways to different recordings. "We have discovered that heavy wear and tear on recordings is in inverse proportion to the seriousness of their content. The lover of good music is protective of its reproduction."[73]

The lover of "good music" may be the person who listens to classical music, jazz, popular music, etc., and who has a high regard for recorded sound. Philip L. Miller in 1955 discussed three kinds of ailments which

may afflict the "Record Collector" and user of a library's record collection: *Symphonitis*, in which a person is addicted to music regardless of the quality of the product; *Hi-Fi*, in which a person is attracted by pure sound without regard for content; and *Artistitis*, in which a person cares neither for sound nor content but only for the interpreter, especially if he or she be a singer.[74]

STEREO: A NEW ERA

Stereo, with its enhancement of depth and realism, was the final great improvement in audio recordings before the 1980s. Work on two channel sound had begun in the 1930s when the Bell Telephone Laboratories had experimentally recorded the Philadelphia Orchestra under Leopold Stokowski in stereo on a 33 1/3 rpm shellac disc. Although the fidelity was not the best, the depth achieved was striking. Certainly there were many problems left to be solved—mainly the lack of a quiet surface material—but the basic idea proved practical. The widespread use of plastic and the smaller grooves brought about a renewal of interest in stereo in the 1950s.

The first commercial attempts used a device with two separate pickups attached to a forked tone arm upon which were mounted two discrete styli. Introduced by Emory Cook, this was called the Binaural system. The record was banded in two parts: a "right" and a "left" band. Due to the complexity, the difficulties of perfectly phasing the two bands, and the playing time of half that of a normal disc, the system was abandoned very shortly after it appeared.[75] What eventually gained acceptance was the present stereo system in which a combination of vertically (hill-and-dale) and laterally recorded sections of the same groove allow a separation of sound with the resulting depth using only one combination pickup and stylus. This idea had formerly been developed by an Englishman named Alan Dower Blumlein in 1931. Blumlein used a 78 rpm shellac disc for his pressings and a pivoted stylus which allowed movement either vertically or laterally. His efforts were terminated by World War II and the public was not introduced to stereo until December 1958 after a great industry-wide push.

When stereo arrived, monaural recordings (one channel, mono) became sonically less desirable although very few librarians realized the true extent of the sonic revolution heralded by stereo. Many others thought it was merely a frill which, to the true music lover, would pass overnight. Of course some problems accompanied the early stereo recordings. At first they cost more than similar mono releases—about one dollar more than

mono recordings in each price bracket in 1960—and could not be played on mono machines without damage. Though virtually unbreakable, plastic stereo LPs were worn and mistreated because the average library patron still had a mono machine in his home and was often unaware of the damage—destruction of the stereo effect—inflicted by the wider and more rigid mono stylus in the small stereo grooves. As these technical difficulties were conquered, and as record companies gradually phased out their mono releases and began to manufacture compatible equipment, librarians began to recognize, accept, and use stereo.

But librarians' acceptance of stereo took a rocky path. A survey of libraries in 1960 by Chester K. Davis, assistant librarian, Rodgers Library, New Mexico, showed that most librarians hesitated to invest in stereo discs because they were more expensive and more easily damaged than mono. It was simply not practical to have stereo discs played on incompatible mono machines. Librarians suggested that the public, "will need about five years of education before stereo records can be practical for general circulation."[76]

According to Davis's survey, one library reported a 50% annual loss and not only from incompatible equipment! "Records left in sunlight assume interesting but unfortunate new shapes," the librarian reported. Librarians had been alarmed about heat damage since the early 78 rpm days, but apparently some patrons were still uninformed.[77]

Davis's survey also showed that tape recordings were mainly restricted to colleges, especially in music departments where assigned items, which would be heavily used, were transferred to tape to be used over and over. Tape, either in reel-to-reel or cassette form, has never been a staple of libraries' collections. The most collected form was, and remains for the time being, the disc—first in 78 rpm and then in LP. "Our technological generation," one librarian remarked in 1971, "does not seem yet to have produced an average library patron who can manipulate an open-reel tape recorder."[78]

For libraries, tape's disadvantages outweighed its advantages—prerecorded tapes are usually more expensive than comparable discs; tapes may be accidentially erased; checking a tape for damage requires audition while a disc's surface may be at least superficially inspected by the naked eye; reel-to-reel tape may be rewound with the wrong end out, or rewound on the floor, thereby bypassing the takeup reel altogether; it is hard to find a specific part of the whole, for there are no bands; tapes deteriorate through lack of use and may curl, stretch, break, or lose sound quality if

not carefully handled and stored; and cassette tapes are more fragile than discs, the mechanism prone to jamming because of misuse.

Disc collections, however, flourish. In the 1960s, one of the more important events was the granting of $150,000 from the Rodgers and Hammerstein Foundation in 1964 to allow The New York Public Library record archive to make available 90,000 records to the public for the first time. Listening equipment was installed and the records cataloged for the first time. The collection, started in 1937, contained older recordings as well as the most recent LP releases. The archives possessed Lionel Mapleson's wax cylinder recordings of performances at the Metropolitan Opera, 1901-1903. The purpose, of course, was to preserve musical heritage rather than provide casual listening. The public could come to the library to listen, but the records were never in the listeners' hands.[79]

Throughout the United States the circulation and demand for records—and for playback equipment—increased. If librarians thought they would get a respite from technological advances they were wrong. The quadrophonic system (quad) arrived in the late 1960s. Instead of two independent sound channels (stereo), quad had four—two in front and two in the rear. But even die-hard audiophiles balked at the idea of adding two more matched speakers and amplifiers. Not only was it too expensive but the end result offered very little sonic advantage over stereo. Even though quad was compatible with stereo playback equipment, frequent playings wore the third and fourth channels down. Within the quadrophonic system itself, incompatible coding systems (SG, Qs, CD-4), were introduced. A further deterrent to libraries was the quad headphones. Four speakers, two to an ear, were expensive and heavy, besides being abnormal. Quad was a fad that died out after a few years whereas stereo was more practical and longer lasting.

The high demand for tapes and records continued, but in the 1970s the "energy crisis" and "oil shortage" affected the quality of these products. The acetate base of tapes and the vinyl in records is manufactured mainly from oil. To compensate for less oil and high demand, record manufacturers thinned out the amount of polyvinyl used for each and included more filler in the blends. This made records thinner, tapes thinner and shorter. Problems arose because thin discs used with shrink-wrap packaging increased disc warpage. RCA's "Dynaflex" paper-thin discs were especially troublesome. More filler also meant more surface noise. Recycling old records caused production flaws, and inferior grade vinyl produced distortion on even original pressings. The playback speed of the shorter tapes was slowed to 3 3/4 inches per second from 7 1/2—1 7/8 ips became

the standard for cassettes—increasing distortion, tape hiss, and the risk of breakage.[80]

DIRECT TO DISC, DIGITAL, AND THE COMPACT DISC (CD): 1980s

Direct to disc is a recording process in which the intermediate taping stages are eliminated and with them tape hiss. It is essentially the same kind of recording process that was used for 78s before World War II, but advances in the technology have made possible a clearer, more "live" sound.

The digital recording technique, on the other hand, is one of the two important developments of the 1980s. It uses digital computer measurements of intensity and frequency which then may be encoded in the binary language of computers and stored in memory circuits. The idea is not to copy perfectly the original signal, but to record the instructions for reconstructing that signal. In the analog process, wave forms are represented by physical likenesses; fidelity is determined by how closely the likenesses or copies resemble the original wave forms. Because the digital process does not copy and reproduce—it records instructions and reconstructs—fidelity does not depend on the similarity of stored information to the original. Elimination of the hiss caused by the tape recording intermediary stage and an immense increase in frequency and dynamic range are the chief advantages of the system. Gradations in accuracy between various machines is determined by their sampling rate—i.e., the number of measurements made per second. Digital recordings may be mastered through conventional cutters from which discs are pressed—and played on conventional equipment—or released in the compact disc form.[81]

The CD is the second breakthrough, and perhaps the most important. It is a product of two different but complementary techniques—the digital computer and the optical video disc. The CD's laser-encoded disc of plastic is coated with a layer of aluminum and protected with a final coat of lacquer. Less than half the size of current LPs, its pitted surface is read by a low-power laser. The master disc of polished glass is coated with a light-sensitive material and rotated on a turntable under a high-powered laser controlled by the digital computer codes, then the exposed sections of the disc are etched away in a chemical bath leaving pits on a spiral groove.[82]

Unlike the LP which rotates at a constant 33 1/3 rpm, the CD rotates at variable speeds ranging from 500 rpm at the center to 200 rpm closer to the edge. The low-power laser stylus causes no wear on a CD's surface, but even

it is not totally impervious to misuse. Dust, fingerprints, or scratches can mar the outside surface. Nevertheless, with proper care, the CD should outlast an LP.[83]

Will the CD and the CD player make vinyl LPs and mechanical playback systems obsolete? Probably. When the sonically superior and more convenient LP was introduced it eventually made the 78 rpm obsolete. The basic system was still mechanical, however, and with adapter and two-speed turntables, 78 rpm and LP discs could be played on the same machine. (Even stereo and monaural discs ultimately had a single compatible machine.) A record collection of 78s could be augmented by LPs just as today CDs could be added to a collection of LPs. The one basic difference is that the CD's laser stylus is not compatible with the LP's diamond stylus; the CD requires a different machine although a CD player could be added to a current system alongside an LP turntable. An exclusively CD record library, on the other hand, would mean beginning a new collection. The CD has brought a totally new technology to the audio world and only time will tell if all LPs will go the way of the 78s.[84]

SELECTION: WHAT AND WHY

> 1938—"Duplication of recordings was long an annoyance to music-lovers who wished to see a big repertory established and is still too frequent. In 1933 there were on sale in Britain thirty-seven records of Handel's *Largo*, forty-one of the 'Blue Danube Waltz,' and thirty of the Bach-Gounod 'Ave Maria,' and the few most important symphonies, etc., are also still over duplicated to the neglect of others."
>
> Percy A. Scholes[85]

> 1963—"What is a librarian to do, set up a panel of judges to select the "five best" or should it simply acquire all thirty-eight recordings of the Pathétique?"
>
> Paul Henry Lang[86]

> 1981—"*Gramophone* listed twenty-four recordings of Beethoven's 6th Symphony; *Schwann* had twenty-three, with thirty-one recordings of Beethoven's 5th Symphony; *Diapason* reported thirty versions of both the 6th and the 5th. There was one recording of Amy Beach's Violin Sonata."

What is a librarian to do, indeed. Some seem to have left the matter of what to buy to chance, others have relied on gifts. But many—among them the Antioch College Library—adopted the policy, beginning in the 78 rpm days, of purchasing recordings unaffordable to most private collections, especially complete operas. "Naturally people who would hesitate to pay

fifteen or twenty dollars for *Carmen* or *Rigoletto* are grateful to be able to borrow and hear these expensive sets in their own homes," Janet Northup, music librarian at the Iowa City Public Library, noted in 1954.[87] Less expensive single records and the latest hit tunes released on 45 rpm were not considered. Librarians simply felt that such recordings were within the range of most individual's budgets or could be heard on the radio.

Although librarians have and continue to try to stimulate interest and give patrons a chance to audition recordings, one criticism of record collections, especially in public libraries, is their tendency to reflect the state of the serious music scene as it exists in the concert hall. In the early 78 rpm days, this was not even a valid criticism, for the standard fare available to librarians consisted of a restricted repertoire with an abundance of selections from Italian opera. There was not always a choice; a work was either recorded or it was not. As recording techniques improved, more works from different musical eras became available in their original scoring. In the 1950s, pieces from the Medieval, Renaissance, and Baroque Eras made their debut on the long-playing disc. Full length operas also became more readily available on LP. Still, duplication of popular works dominated the recording industry's agenda to the neglect of less salable items which were lucky if they found their way to the disc through smaller, harder-to-get labels.

With the greater selection available in recent years, many libraries have written detailed selection policies based on the needs of their clientele. The goal is to buy recordings of lasting value which patrons will want to hear and to achieve a well-rounded collection. In many cases, the record-buying public looks to the libraries for guidance and for an introduction to musical works in various styles.

If the problem of selection within the classical repertoire are difficult, then consider the question: "Does popular music, especially Rock, have a place in a library's collection?" The answer is "yes" at the Gates Public Library, Gates, New York. Of all pop music releases, 50% are purchased in LP, 45 rpm, cassette, or 8-track form and the Rolling Stone Top 100 Albums chart, posted in the library, shows patrons what hits are newly acquired. Record reserves are taken just like book reserves. "The all-time high for record reserves was thirty-seven for Pink Floyd's 'The Wall,' " the librarian reported. Because one copy of an item is purchased for each five requests, the library acquired seven copies of "The Wall." "The library keeps teenagers as library patrons," the librarian further commented, "because we respond to their needs and interests equally with their parents' needs and interests."[88]

Selection policies based on the "Top Ten" and patron requests do not always find universal favor. Since chart popularity is often the result of advertising "blitzes," one librarian advocated excluding recordings which quickly fade away in popularity and for which demand drops precipitously, especially after continuous playing on the radio. Even though such a policy may cause "resentment among members of the public interested only in the latest hits" it allows the librarian to search out what is of sufficient quality to be enduring.[89]

Another librarian suggests that libraries should emphasize types of popular music which their local radio stations do *not* play. He stresses the importance of buying hard-to-find releases instead of the "Top Ten" on 45 rpm.[90]

"Do we tell the borrower who asks for a new record to come back in a year's time when we'll know if it's of lasting value or not?" David Lister counters. He claims that libraries do not apply the same criteria to new fiction. (Do libraries buy all the latest releases in the paperback Harlequin Romance series?) Besides, he says, the "real problem" in selecting popular recordings is "how to satisfy the seemingly limitless demand" for them.[91]

"It all really comes down to a matter of personal taste," Jerry Mulberg commented, "there are very few essential Rock albums, if any. Surely the whole point of Rock is its contemporaneity."[92] Contemporary popular music may be endlessly played on the radio during its brief span of popularity, or it may last for years. If librarians since the early days of the record have felt that such ephemeral music could be purchased by individuals instead of by libraries, why should selection policies drastically change to reflect the current demand for Rock?

"If book collections had been developed with the principles of selection used by today's record librarians, libraries would contain only incunabula and classical literature," one librarian remarked in 1968.[93] If, on the other hand, librarians had catered to the popular tastes of each era, record collections would contain only the hits from each year—hits probably long forgotten or only a matter for nostalgia. Florence Fisher, librarian at the Peoria Heights Public Library, noted in 1958 that the same standards should be applied to selecting recordings as to books. Fisher's aim was to purchase "things that are worth while but also things that people will like," and she admitted that: "For musical illiterates like ourselves, working with records is more difficult than working with books."[94]

Whatever the nature of the collection, in either a public or academic library, it should be arranged in a manner accessible to both librarians and

patrons. Librarians have tried a variety of systems—arrangement by accession number, by manufacturer's number, by adaptations of the Dewey Decimal or the Library of Congress classification schemes, or alphabetically by composer, author, or title. Many public libraries favor record stacks accessible to patrons in combination with a browsing classification Alpha-Numeric System for Classification of Recordings (ANSCR) which uses prefix letters to describe the kind of music on a given disc. A popular system in academic libraries, on the other hand, is to shelve the collection by accession number in closed stacks.

Whether in open or closed stacks, record collections have always been popular. Strangely enough, many librarians have noticed that more men than women borrow records and use phonographs in the library. In 1938, Louise Chapman, at the Minneapolis Public Library, observed this phenomenon and 18 years later in 1945, the Public Library of Cincinnati reported similar findings with a ratio of four men to one woman borrowing records. One excuse offered was that 78s were heavy, but record weight could hardly have been a major factor in borrowing habits, because in 1960, after the introduction of the lighter LP, the same complaint was heard. "What ails the women anyway," one female librarian wanted to know.[95] "Determined' nine-year-olds were seen staggering out, under the weight of several Beethoven symphonies [78s]" at the Oconomowoc Public Library, Wisconsin, in 1958.[96] If nine-year-olds could do it, why not women?

Despite a prolonged struggle with technology—or the lack of it—and negative attitudes, record collections in public and academic libraries continue to grow. Their popularity may be measured by yearly increasing circulation statistics and patron interest. Recorded sound whether in the form of piano rolls, 78s, LPs, or CDs, attracts people to the library more readily, in some cases, than do books. Although librarians continue to wrestle with the headaches of what to buy (both equipment and recordings), where to put it, and how to arrange it, the sound recording and the phonograph have become an integral, if not indispensable, part of any library.

REFERENCES

1. Scott originally used a glass cylinder with a smoke-blackened surface. Later this glass was replaced with a roll of paper.

2. *The New Grove Dictionary of Music and Musicians*, 6th ed., s.v. "Sound Recordings, Transmission and Reproduction," by D.E.L. Shorter and John Borwick.

3. Gelatt, Roland. *The Fabulous Phonograph, 1877-1977*, 2d rev. ed. New York: Macmillan, 1977, p. 24; and Smart, James R., and Newsome, Jon W. *A Wonderful Invention: A Brief History of the Phonograph from Tinfoil to the LP* (an exhibition in the Great Hall of the Library of Congress in Celebration of the 100th Anniversary of the Invention of the Phonograph). Washington, D.C.: LC, 1977, p. 5.

4. Scholes, Percy A. *The Oxford Companion to Music*. London: Oxford University Press, 1938, p. 376.

5. *The New Grove Dictionary of Music and Musicians*, s.v. "Sound Recordings."

6. Read, Oliver, and Welch, Walter L. *From Tin Foil to Stereo: Evolution of the Phonograph*, 2d ed. Indianapolis: H.W. Sams, 1976, p. 31.

7. As early as 1878 Edison addressed the question of what services the phonograph could provide and listed a number of possible uses for it: to provide reading and listening material for the blind; to teach languages; to reproduce music; as music boxes and toys; as alarm clocks; to record telephone conversations. von Broich-Oppert, Irmgard, and Zahn, Wilfried. "From the Talking Machine to the Kuntskopf: One Hundred Years of Sound Recording." *Fontis Artis Musicae* 25(Jan.-March 1978):92.

8. *The New Grove Dictionary of Music and Musicians*, s.v. "Sound Recording."

9. The "nickle-in-the-slot" era lasted roughly from 1890 to 1908.

10. Smart, and Newsome, *A Wonderful Invention*, p. 13.

11. Gelatt, *The Fabulous Phonograph*, p. 71.

12. Ibid., p. 65.

13. Ibid., p. 66.

14. Morton Lee discussed various types of phonograph needles available in "Design for Hearing, Part II," Music Library Association *Notes*, 2d ser. 4(Dec. 1946):111. For library use he recommended the "Pfanstiehl Semi-Permanent" needle or a sapphire needle. Two problems with sapphire needles were the ease with which they could be stolen and their high cost—about $7 in 1946. In addition, sapphire needles required a lighter pick-up, one ounce or less, or damage to the discs would result. Lee also stressed that, "under no circumstances should cactus or thorn needles be used," because they gave less response than steel and tended to destroy the frequency response of the equipment.

15. Gelatt, *The Fabulous Phonograph*, p. 66.

16. Read, and Welch, *From Tin Foil to Stereo*, pp. 88-90; and Smart, and Newsome, *A Wonderful Invention*, p. 19.

17. McWilliams, Jerry. *The Preservation and Restoration of Sound Recordings*. Nashville: American Association for State and Local History, 1979, p. 5.

18. Bell and Tainter's research led to a continuously variable rpm turntable for recording and playing discs. The disc turned slowest when the stylus was near the edge and continuously faster as the stylus approached the center. This allowed a constant speed for the surface passing under the stylus. They never perfected it, however, and introduced a cylinder record to the public in 1878. The variable rpm turntable was forgotten. Read, and Welch, *From Tin Foil to Stereo*, pp. 36, 120.

Edison had designed a disc machine in 1878. Although it was easier to attach tin foil to a disc than to a cylinder, he also abandoned the disc because the quality of sound deteriorated badly toward the center of the disc. Gelatt, *The Fabulous Phonograph*, p. 28.

19. The hill-and-dale or vertical cut was not flawless. Although better suited to acoustic recording, the highs or hills were worn down and flattened out by the heavy tone arms. Gelatt, *The Fabulous Phonograph*, pp. 166-67.

20. An Edison tin foil phonograph built in London in 1878 was the first commercial phonograph to have a motor—run by gravity—and a governor. In 1889 Edison introduced a battery-powered phonograph which sat on top of a sewing machine stand with a box containing four wet cells beneath. He also introduced a model using a six-to-eight volt DC motor which could be operated from a 110-volt DC lighting circuit. Another model was water powered. A governor controlled the speed and a flexible hose connected a water faucet to a paddle assembly. Read, and Welch, *From Tin Foil to Stereo*, pp. 252-53.

21. Eldridge R. Johnson owned a small machine shop in Camden, N.J. In 1896 he made a spring driven motor for Berliner and later most parts for the gramophone. He formed the

Victor Talking Machine Company in October 1901. The stock was owned by Johnson and Berliner with the majority held by Johnson.

22. Scholes, *The Oxford Companion to Music*, p. 378.

23. Athern, Mary E. "Mechanical Arts and the Library" (editorial). *Public Libraries* 19(Feb. 1914):48.

24. Lindsay, Mary B. "Evanston Public Library." In "Symposium of Music in Libraries, Contributed by Various Libraries in the United States." *Library Journal* 40(Aug. 1915):568.

25. Ibid. Although the Evanston Public Library's player-piano roll collection remained popular well into the 1930s, the Library of Congress discontinued storing and circulating rolls in 1923. The rolls were distributed to institutions such as the Army and Navy hospitals. U.S. Library of Congress. *Report of the Librarian for the Fiscal Year Ending June 30, 1924*. Washington, D.C.: USGPO, 1925, p. 96.

In 1964, the Fort Worth Public Library (Texas) disposed of its grand player-piano and rolls "because of space and repair limitations." Bradley, Carol June. *Music Collections in American Libraries: A Chronology* (Detroit Studies in Music Bibliography, no. 46). Detroit: Information Coordinators, 1981, p. 160.

26. Seckelson-Simpson, Linda. "Music Resources in the Evanston Public Library." *NU Quarter Notes* 12(Spring 1984):8.

27. Bernhart, Ada L. "Morrison-Reeves Library, Richmond, Ind." In "Symposium of Music in Libraries, Contributed by Various Libraries in the United States." *Library Journal* 40(Aug. 1915):573.

28. Bradley, *Music Collections in American Libraries*, p. 77.

29. Bailey, Louis J. "Gary Public Library." In "Symposium of Music in Libraries, Contributed by Various Libraries in the United States." *Library Journal* 40(Aug. 1915):573.

30. Bradley, *Music Collections in American Libraries*, p. 81.

31. Johnston, W. Dawson. "St. Paul Public Library." In "Symposium of Music in Libraries." *Library Journal* 40(Aug. 1915):574.

32. Harrison, J.L. "Forbes Library, Northampton, Mass." In "Symposium of Music in Libraries." *Library Journal* 40(Aug. 1915):567.

33. "Scope, Usefulness, Founding: Library Extension Work, Phonograph Concerts." *Library Journal* 39(Nov. 1914):870.

34. McWilliams, *The Preservation and Restoration of Sound Recordings*, p. 10.

35. *The New Grove Dictionary of Music and Musicians*, s.v. "Gramophone."

36. Gelatt, *The Fabulous Phonograph*, p. 240.

37. Kurtz Myers wrote that many smaller record companies were forced to use plastic instead of shellac because by May 1946 shellac sold for $45 a ton vs. a "normal" price of $14. See Myers, Kurtz. "Current Report on the Record Industry." Music Library Association *Notes*, 2d ser. 3(Sept. 1946):413. Irving Kolodin noted that the shellac shortage caused the need to develop a synthetic replacement. He also commented that the Office of War Information sought out a replacement so that their propaganda programs would be on light, unbreakable, bendable discs. See Kolodin, Irving. "The Vinyl Decade." *Saturday Review*, 28 Sept. 1957, p. 41.

38. Lee, Morton. "Design for Hearing." Music Library Association *Notes*, 2d ser. 3(Sept. 1946):400.

39. In 1962 the American Library Association published for the first time a report based on a study conducted for the Library Technology Project by the United States Testing Company. Entitled *Evaluation of Record Players for Libraries*, it described and evaluated equipment, including headphones, which received a "recommended," "intermediate," or "not recommended" rating.

40. Tilly, H. Dorothy. "Detroit Lends Records!" Music Library Association *Notes*, 2d ser. 1(June 1944):42.

41. Ibid., p. 43.

42. Ibid., p. 45.

43. Ibid., p. 44.

44. Lyle, G.R., and Krauskopf, Rose. "Phonograph Collection in Antioch College Library." *Library Journal* 59(15 March 1934):267.

45. Bixler, Paul, and Mills, Julia. "We Shall Have Music." *Library Journal* 66(1 Jan. 1941):19.

46. Lyle, and Krauskopf, "Phonograph Collection," p. 267.

47. Ibid.

48. Bixler, and Mills, "We Shall Have Music," p. 18.

49. Ellsworth, Ralph E. "Phonograph Records in the Library." *Library Journal* 58(15 June 1933):529.

50. Chapman, Louise. "The Place of the Phonograph in the Library." *Library Journal* 63(15 Oct. 1938):766.

51. Ibid., p. 768.

52. Ibid.

53. Bradley, *Music Collections in American Libraries*, pp. 61, 66.

54. Wilson, Herbert W. "A Commercial Record Lending Library." Music Library Association *Notes*, 2d ser. 2(Dec. 1944):49.

55. Ibid., p. 50.

56. Frebault, Marcelle. "Lending Records: Phonograph Recordings in the Public Library at Newark." Music Library Association *Notes*, 2d ser. 2(Dec. 1944):46.

57. Millen, Irene. "Andrew Carnegie's Music Library." Music Library Association *Notes*, 2d ser. 22(Fall 1965):684.

58. Thompson, Helen. "Riverside Record Collection." *Library Journal* 83(15 Feb. 1958):574.

59. Appel, "Annual Report," *Library Life* 4(1945):52.

60. Bradley, *Music Collections in American Libraries*, pp. 143, 145, 155.

61. "The George Nathan Newman Collection of Phonograph Records." *Grosvenor Library Bulletin* 23(Dec. 1940/March 1941):39.

62. Stoeckel, William C. *Stoeckel's Music Directory 1947* (edited for the Buffalo and Niagara Frontier). Buffalo, N.Y.: Music Directory of Buffalo, 1947.

63. Kemp, Muriel L. "The Worcester Free Public Library Gives Discs Full Treatment." *Library Journal* 73(1 March 1948):408.

64. Machus, Josephine, et al. "Recordings in Public Libraries, Three Success Stories." *Wisconsin Library Bulletin* 54(July/Aug. 1958):260.

65. The extended play 45 rpm disc could be played on the same machines as regular 45s. Radio Corporation of America. *The 50-Year Story of RCA Victor Records*. New York: Department of Information RCA, 1953, pp. 10-13.

66. Bradley, Carol June, and Coover, James B. "Vassar's Music Library: The First Hundred Years." Music Library Association *Notes*, 2d ser. 35(June 1979):844. Also, for a compilation of ten years (1947-1957) of reports on the recording industry see Jellinek, George. "10 Years of Recordings." *Saturday Review*, 28 Sept. 1957, pp. 44-48. He notes that Columbia's first vinyl release was Mozart's G minor symphony (the latter of the two, K. 550) conducted by Fritz Reiner.

67. Myers, Kurtz. "Current Report on the Record Industry." Music Library Association *Notes*, 2d ser. 3(Sept. 1946):411.

68. Anderson, Ruth. "Planning a Record Collection for a Public Library." *Wisconsin Library Bulletin* 50(May/June 1954):105-09.

69. Siniff, Helen. "A Rental Record Library." *Illinois Libraries* 38(Nov. 1956):303-04.

70. Weisbord, Marvin. "A Public Library Discovers Music." *Music Journal* 12(July 1954):8.

71. Brown, Karline. "From Low Estate to Hi-fi." Music Library Association *Notes*, 2d ser. 13(June 1956):407.

72. _____. "New Sights and Sounds." *Library Journal* 81(15 Sept. 1956):1952.

73. _____, "From Low Estate," pp. 418-19.

74. Miller, Philip L. "Record Collecting." *Library Journal* 78(15 March 1953):512.

75. Very much like Cook's binaural disc system was the Multiplex Graphophone Grande made in 1898 or 1899. It used a cylinder recorded with three sound tracks and played with three independent reproducing needles and three horns. This may have been an early pioneer stereo, although it was not recognized as such. Besides, the price, $1,000, put it out of reach of most recorded sound enthusiasts.

The Polyphone made by the Talking Machine Company in 1899 had two horns and used a cylinder record. The company advertised that it was twice as loud as a machine with a single horn. Read, and Welch, *From Tin Foil to Stereo*, p. 427.

76. Davis, Chester K. "Record Collection, 1960: LJ's Survey of Fact and Opinion." *Library Journal* 85(1 Oct. 1960):3376.

77. Ibid.

78. Leavitt, Donald L. "Some Practices and Problems in American Record Libraries." *Fontis Artis Musicae* 18(Jan./Aug. 1971):23.

79. "The Record Archive of The New York Public Library." *Fontis Artis Musicae* 11(May/Aug. 1964):94; and Philip Miller to James Coover, personal communication, 10 July 1985.

80. Hoffmann, Frank W. *The Development of Library Collections of Sound Recordings* (Books in Library and Information Science, vol. 28). New York: M. Dekker, 1979, p. 24.

81. Riggs, Michael. "Digital Sound: It's Here!" *High Fidelity* 32(Dec. 1982):45.

82. At the Music Library Association's annual meeting in Buffalo, N.Y., 1955, a representative of Capitol Records announced a new playback system which read lines on a 3 x 5 card with light beams. Supposedly, "production and commercial availability were just around the corner." Bradley, and Coover, "Vassar's Music Library," p. 844.

83. This all depends, of course, on the care taken with LPs which are pretty durable. Besides better sound, the CDs big selling point is the lack of stylus wear. Many fingerprints and scratches can cause errors in the data stream and make the player mistrack. A circular scratch following the groove can make a CD unplayable. Mitchell, Peter. "Inside the Compact Disc System." *High Fidelity* 33(July 1983):43.

84. Radio stations have begun broadcasting CDs; the first was WFMT in Chicago on 30 Jan. 1983. Differences could not be heard on portable radios, but on a good home system, less noise and clearer sound were reported. More FM stations, mainly classical, are purchasing CD players and discs.

85. Scholes, *The Oxford Companion to Music*, p. 379.

86. Lang, Paul Henry. "The LP and the Well-Appointed Library." *Library Journal* 88(1 May 1963):1811.

87. Weisbord, "A Public Library Discovers Music," p. 6.

88. Swanton, Susan I. "Pop Records Popular." *Unabashed Librarian* 38(Feb./March 1981):9.

89. Clark, David Lindsey. "Has Rock a Place in Libraries?" *Library Association Record* 80(Dec. 1978):629.

90. Politis, John. "Pop Music, Yes; Top Pops, No." *American Libraries* 10(May 1979):263.

91. Lister, David. "Pop is Popular [letter in reply to D.L. Clark]." *Library Association Record* 81(Feb. 1979):83.

92. Mulberg, Jerry. "Rocking the Librarian's Boat [letter]." *Library Association Record* 81(Feb. 1979):143.

93. Hagist, Barbara. "Resistance and Reluctance in Record Selection: A Survey of Record Selection Policies." *Library Journal* 93(1 Feb. 1968):518.

94. Fisher, Florence. "Experiment with a Record Collection in a Small Public Library." *Illinois Libraries* 40(Sept. 1958):597-98.

95. Davis, "Record Collection; 1960," p. 3380.

96. Machus, et al. "Recordings in Public Libraries," p. 259.

VITA

Sharon Almquist is currently assistant Monograph Cataloger at North Texas State University and has served in that position since 1983. From 1982 to 1983 she was Music Cataloger/Reference Librarian in the Music Library at the State University of New York at Buffalo. She also served as a graduate assistant in that library from 1981 to 1982.

Ms. Almquist received her B.A. in Music (1980), a M.L.S. (1982), and a M.A. in Music (1986) all from the State University of New York at Buffalo.

OCCASIONAL PAPERS deal with any aspect of librarianship and consist of papers which are too long or too detailed for publication in a library periodical or which are of specialized or temporary interest. Manuscripts for inclusion in this series are invited and should be sent to: OCCASIONAL PAPERS, Graduate School of Library and Information Science, Publications Office, University of Illinois at Urbana-Champaign, 249 Armory Building, 505 E. Armory Street, Champaign, Illinois 61820.

Papers in this series are issued irregularly, and no more often than monthly. Subscriptions for 1987 may be established for $13.00 per year. At least five papers will be issued annually, beginning with number 178 for 1987. Individual copies of current or back numbers may be ordered each for $3.00 plus $.50 postage and handling. *All orders must be accompanied by payment.* Send orders to: OCCASIONAL PAPERS, Graduate School of Library and Information Science, Publications Office, University of Illinois at Urbana-Champaign, 249 Armory Building, 505 E. Armory Street, Champaign, Illinois 61820. Make checks payable to University of Illinois.

Donald W. Krummel, Editor
James S. Dowling, Managing Editor

PUBLICATIONS COMMITTEE

Leigh Estabrook
F. Wilfrid Lancaster
Debora Shaw